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ABSTRACT

This paper presents a paradigm for designing evaluation research studies that permits examination of the effects of curriculum, instruction, and instructional materials on the learning environment as the determinants function independently, as they relate to one another, and as they interact in complex ways in the naturalistic setting. The paradigm is conceptualized as three intersecting circles. Superimposed on the three circles is a triangle that represents the classroom. This configuration yields various areas that can be grouped into six levels for generating research studies. Evaluation research studies are described that illustrate various levels of the paradigm. (Author)

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A PARADIGM FOR DESIGNING EVALUATION STUDIES OF THREE DETERMINANTS OF THE CLASSROOM LEARNING ENVIRONMENT: CURRICULUM, INSTRUCTION, AND INSTRUCTIONAL MATERIALS

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A PARADIGM FOR DESIGNING EVALUATION STUDIES OF THREE DETERMINANTS OF THE CLASSROOM LEARNING ENVIRONMENT: CURRICULUM, INSTRUCTION, AND INSTRUCTIONAL MATERIALS [1]

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ABSTRACT

This paper presents a paradigm for designing evaluation research studies that permits examination of the effects of curriculum, instruction, and instructional materials on the learning environment as the determinants function independently, as they relate to one another, and as they interact in complex ways in the naturalistic setting. The paradigm is conceptualized as three intersecting circles. Superimposed on the three circles is a triangle that represents the classroom. This configuration yields various areas that can be grouped into six levels for generating research studies. Evaluation research studies are described that illustrate various levels of the paradigm.

Many variables interact in complex ways to give each learning setting its distinctive characteristics. Teacher, grouping arrangements, physical arrangements, grade level, subject area, and many other variables have been examined to study their effects on the classroom learning environment (see Bidwell, 1973); the effects of the social environment on learning, in turn, have been the subject of study (Walberg, 1969; Anderson, 1970). Walberg's (1976) synthesis of the literature on self-reported perception of the social environments of learning sorts out many of these studies. For this paper, the classroom is the arena for examining three determinants of the learning environment press: curriculum, instruction, and instructional materials.

Ideally, curriculum, instruction, and instructional materials make differential but essential contributions to an educational program. Their separate impact on a learning environment should be evident and direct relationships to specific environmental characteristics measurable. A clear cut distinction among the three components of an education program, however, breaks down in practice. It is the purpose of this paper to present a paradigm for designing evaluation research studies that permit examination of the effects of the three determinants on the learning environment as they function independently, as they relate to one another, and as they interact in complex ways in the naturalistic setting. The paradigm is presented following definition of terms. The last section of the paper illustrates practical applications of the paradigm.

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Definitions

Definitions operationalizing the three determinants and classroom learning environments are presented below.

Curriculum

A definition of curriculum eludes consensus among curriculum theorists (Rugg, 1926; Zais, 1976) despite its position as an established field of study. We propose a generic definition to provide a conceptual focus for discussing this determinant:

> Curriculum is that which results from a preconceived idea or value position about the purposes of education and constitutes an educational program for fulfilling that purpose.

This definition of curriculum allows for all possible value positions which in turn will determine what content is selected and how it is intentionally organized through learning activities as an educational program to fulfill the articulated purposes. The identified values, selected and organized content, learning activities, and procedures for evaluating effectiveness of the curriculum in fulfilling the purposes of education each contributes to a learning environment milieu as well as imposes in some measure constraints on the learning environment.

Instruction

This determinant encompasses planning and implementing the teacher-learning transactions as generated by suggestions from the curriculum or from the instructional materials.

Instructional Materials

Materials are the physical media through which the intents of the curriculum, mediated instructionally, are experienced by the learner.

Learning Environments

The authors operationalize classroom learning environments as the learners' perceptions of their class that are quantifiable along a number of scales found in two environment press inventories, Learning Environment Inventory (LEI) and My Class Inventory (Anderson, 1973).

The Paradigm

The paradigm is conceptualized as three circles, one representing curriculum, the second instruction, and the third instructional materials. They intersect, as in a Venn diagram, in pairs, and all three intersect in one area. A triangle is

superimposed on the circular figures which represents the classroom. The vertices of the triangle extend beyond the three circles. The configuration of the triangle superimposed over the three intersecting circles yields six levels for generating research studies. Figure 1 illustrates the configuration.

Level 1

Level 1 (the open space within the triangle) is outside the concern of the three determinants and beyond the scope of this paper. It examines the classroom outside the context of curriculum, instruction, or instructional materials. At this level such studies as teacher and student personality or organizational constraints, as examples, are considered.

Level 2

Level 2 explores each determinant apart from the classroom. Hypothetically the effects of the three determinants on the classroom learning environment can be examined independently by holding constant the other two determinants. The vertical marked areas represent Level 2 studies.

Level 3

Level 3 remains hypothetical, i.e., outside the realm of practice. It involves the relationship between any two of the three determinants. The relationship between any two determinants is directional, either one-way or two-way. Changes in the curriculum can determine instructional changes and/or instructional changes can impose modifications on the curriculum. Level 3 is shown as the horizontal areas in Figure 1.

Level 4

Levels 4, 5, and 6 are set within the classroom. Level 4, shown in the areas of Figure 1 as criss-cross lines, generates one or two-way directional studies that explore the effects of curriculum, or instruction, or instructional materials on the classroom learning environment; in turn, the environment modifies the curriculum, or instruction, or the use of materials.

Level 5

Areas in the diagram where two determinants intersect within the triangle are designated as Level 5 studies (shown as dotted areas). As an example of Level 5 studies, the relationship between curriculum and instruction as both affect each other and relate to the classroom can be characterized.

Level 6

Level 6 brings together the three determinants within the classroom context

for study of all possible interactions. See the solid area in Figure 1.

To study systematically the effects of curriculum, instruction, and instructional materials on the classroom learning environment, the researcher needs to identify not only the level but designate the dependent and independent variables or the direction of the relationship. As an example, does the study involve a single determinant in a single direction, i.e., the effects of curriculum on the classroom with learning environment changes a byproduct? Using a single determinant involving two-way directionality (effects of curriculum on the class and the class on curriculum) increases the complexity of a study, but moves towards a more realistic representation of studying the learning environment. As another level is added to a study with multidirectionality, studies of the learning environment in the classroom setting show additional complexity.

There are other realities beyond the classroom that impact on the determinants. Although these are not the subject of the present paper, we must be aware of their existence. These include the school and school district, schedules, budget, teacher and student variables, administrative support and constraints, the physical plant, parents, and the larger community.

Examples of Evaluation Research Studies Drawn from the Paradigm

The studies presented in this section are categorized in two ways, hypothetical studies as defined by Levels 1 through 3, and reality-based studies as in Levels 4 through 6. Several examples of hypothetical studies are first presented that illustrate Level 2 and Level 3-type studies. The closing section reports on the findings of Level 4, Level 5, and Level 6 evaluation research studies which were conducted in the naturalistic setting.

Hypothetical Studies

By their very nature, learning environment outcomes are speculative in Level 2 and Level 3 studies until they are set into practice. However, the examples of both levels illustrate potential relationships or possible effects.

Level 2 studies. Stratemeyer and associates (1947) developed a curriculum predicated on assisting students in resolving "persistent life situations" as the purpose of education. The curriculum emphasized the learner and his need to acquire the necessary skills to cope in society. The curriculum included topics and subjects thought to be of most benefit to students within a persistent life situation context. Given this curricular purpose, areas for study were grouped under three major headings: situations calling for growth in individual capacity; situations calling for growth in social participation; and situations calling for

growth in ability to deal with environmental factors or forces. The typical subject centered curriculum gives way to a curricular organization designed around the three-area framework.

Under such a curriculum design, we can hypothesize that the student would be encouraged to explore, question, and select among alternatives. Students engaged in the supporting learning activities would possibly view their learning environment as cohesive, goal directed, and cooperative.

By way of contrast, the Physical Science Study Committee (PSSC) curriculum was a creation of scientists encouraged by political policy makers to update the teaching of physics, thereby preventing the United States from lagging behind Soviet Russia in the space exploration race of the 1950's. They saw a need to channel the brightest students into science and engineering to provide the United States with high-powered scientists and technicians. The purpose of education, thus, was to strengthen the United States in its role as the foremost world power. The physics curriculum was designed "to provide a sound foundation in high school for those students who plan to study science or engineering in college" (Hurd, 1970, p. 188). A curriculum designed to serve this purpose would tend to encourage students to excel as individuals, to master challenging and difficult scientific problems, and to build strong quantitative skills. A different type of learning environment than one based on "persistent life situations" is a likely outcome.

As seen from the two examples, a curriculum developed with a given educational purpose can encourage particular learning environments.

A second Level 2 hypothetical study is illustrated by the following example. Over the past hundred years textbooks have played a singular role in education. To this day they are the curriculum in many classrooms. As such the school district's philosophy of education,curriculum and instructional practices emanate from these materials (Talmage, 1972). As teachers and administrators delegate this decision making authority to instructional materials, textbooks and other supporting instructional materials tend to determine the learning environment. A recent national survey conducted by the National Survey and Assessment of Instructional Materials found that over 90 per cent of the students' time in classroom learning activities engages them with instructional materials (EPIEgram, 1976).

Contrasting learning environments can be expected if teachers follow textbooks as they are designed. Comparison of two reading classes using two different reading series suggests two different types of learning environments. McGuffy's Eclectic Primer (1886) served for many generations as the reading curriculum of school districts across the United States. It was more than a reading curriculum or a language arts curriculum. It laid out the lessons, the instructional sequence,

the activities and response modes, teaching approaches, and evaluation of student progress. In addition it set a moral tone for expected social behavior. Visions of a McGuffy reading class' learning environment suggest lack of disorganization but also lack of diversity and democracy, and a high degree of formality, goal directedness, and competitiveness.

A present day Scott, Foresman Systems classroom takes on an entirely different learning environment. Materials at a number of different levels are used. The teacher's role moves from direct instruction to facilitation as the need requires, students group and regroup depending on the specific activities, and the learning pace varies for different students. A variety of media are employed to accommodate varying learning styles. If implemented in the classroom as designed, Scott, Foresman Systems' learning environment might be characterized as cohesive, supporting diversity, democratic, but possibly perceived as difficult and disorganized to some students.

Level 3 studies. Ideally curriculum design dictates instruction. In the case of a biology curriculum whose organizing focus or rationale builds upon an exploratory approach, we would expect the learning environment to be perceived differently by students than an approach to science based on the acquisition of an organized body of information. In the first case the students are involved principally in open ended activities; in the second case, the body of knowledge is usually acquired through attending lectures, reading, viewing audio-visual presentations, and recitation.

Instruction is further mediated by the goals of each curriculum regarding the social aspects of learning. If a goal of the exploratory curriculum were acquired through cooperative inquiry, we would expect the students' perception of their learning environment to differ from students engaged in an exploratory curriculum that involves students with individualized, self-paced, or self-instructional exercises.

In sum, curriculum, instruction, and instructional materials can and do exert separate and interactive influences on the learning environment.

Studies Conducted in the Naturalistic Setting

Three evaluation research studies are presented, one at each of the levels within field settings. The Level 4 study illustrates the effects of an instructional approach on the learning environment. The Level 5 study involves the interactive effects of curriculum and instruction on the learning environment. The final study reported is a Level 6 design that examines the learning environment of an experimental school.

Level 4 Study (Hart and Talmage, 1976). Under a National Science Foundation (NSF) grant, teachers in a large metropolitan area were engaged in a year-long study on an investigative approach to teaching elementary mathematics in grades Kindergarten through eight. Investigative teaching was defined operationally as an instructional approach involving the students in learning activities that pose problems whose potential solutions require exploration in a laboratory setting. The teacher's role included posing problems, asking probing questions, and fostering a learning environment in the mathematics class that encouraged sharing of ideas without fear of failure or ridicule.

It was hypothesized that a conscious awareness of the characteristics of investigative teaching would transfer to the participants' own classroom teaching as measured by changes in the learning environment. The subjects were students in 46 public and parochial classes in metropolitan Chicago; the unit of study was the class. The schools in which the classes were located varied widely in their physical plant, provision of instructional materials, and other support to the teachers. The National Science Foundation participating teachers taught in 23 of the classes; 23 nonparticipating teachers constituted the control group. Each Saturday morning throughout the academic year, the NSF participants spent two hours actively involved in building on their understanding of basic mathematics concepts through investigative instructional encounters. Another two hours were devoted to analyzing the teaching and learning approaches that characterize investigative teaching in mathematics.

The design of the mathematics study conforms to a Level 4 design with the focus on instruction as the learning environment determinant and the classroom as the learning setting context. Directionality was two-way, with instruction holding potential for modifying the learning environment and the inital classroom learning environment interacting with instruction. Five learning environment scales from My Class Inventory defined the environmental press: cohesiveness, competitiveness, difficulty, friction, and satisfaction.

The findings from a step-wise multiple regression analysis indicated that the variable, group, contributes significantly to the cohesiveness of the learning environment. After the effects of the classes' pretest scores on their perception of cohesiveness were removed from the regression equation, group accounted for a significant amount of the variance. The experimental classes perceived greater cohesiveness in their mathematics learning environment than did the control classes at the end of the year (Talmage and Hart, 1977). Experimental cohesiveness gains, however, are somewhat modified by grade level. The primary classes exposed to investigative learning situations show dramatic increase

in cohesiveness, while both intermediate groups and the control primary show decreases in the classes' perception of cohesiveness from pre to posttest. Regardless of the school system (public or parochial), the experimental group shows gains in cohesiveness while the control group in both public and parochial systems decreases in cohesiveness from pre to posttest.

Other significant changes in the learning environment were observed but these changes were due to factors other than investigative teaching.

The outcome of this study does indicate that a Level 4 design for studying the impact of instruction on the learning environment can assist in separating out the effects of instruction from curriculum and instructional materials.

A Level 5 Study (Eash and Rasher, 1976). Desegregation of a school system and the subsequent busing of students heightens a number of tensions in faculty, parents and children. Often the focus for alleviating these tensions is seen to reside in some human relations training which is directed to calming the individual's emotional stress through increased knowledge of self and more accurate self perception of others. While this seems eminently reasonable, the result as tallied by the objective measures has not been reassuring. For the most part results from these generalized human relations approaches have not affected student achievement. Consequently one of the major objectives in plans for desegregation is not realized. Thus we believe that a directed plan which focuses on curriculum and instruction is a basic element in establishing a learning environment in a desegregation setting where students can improve their academic achievement. Futhermore, we believe that the consequences of such a strategy do spill over to the achievement of other social and personal goals encompassed in the rubric of a more democratic society where each person is able to achieve his growth potential.

Forrestville is a suburb which experienced rapid growth as a bedroom community after World War II. As a community it has long served the demand of young couples for inexpensive housing for raising families. In an enclave of the community a segregated area grew until one of the eight schools of Forrestville contained a segregated black population which constituted 25% of the total district population. Under the watchful eye of the State, and with some encouragement, a desegregation plan was adopted in 1971 which reorganized schools into K-3, 4-6, 7-8 grade groupings and placed the ratio of black students in each school to approximate the ratio of racial populations in the district. This set-up generated considerable tension in the district and a situation for white

flight became a distinct possibility. There was need for policy at the School Board level to insure desegregation was successful and to bring about integration. A nearby university was contacted to set-up an evaluation research design which would provide information that could be used in policy formulations by the School Board and to direct the administrative staff efforts in the curriculum and instruction program.

In the evaluation research design, carried out over a five year period, a number of measures were used, including the Learning Environment Inventory (LEI). The data were interpreted by the university and reported back to the administration and the School Board. It soon became apparent that curriculum and instruction required considerable attention if the achievement of all races was to improve. Having a data base on learning environments and achievement soon established that: 1) rumors of school differences which were circulated to the School Board were baseless and inaccurate; 2) in some schools black children achieved more than their similar counterparts in other schools; 3) discipline problems in the middle schools were not interracial nor were serious discipline problems widespread among students; a few students were producing most of the major problems; 4) in-service in specific subjects for teachers did not result in sustained achievement if measured across years; and 5) there was a need to draw principals into developing an instructional improvement system that gave consistent attention to the interaction of instruction and curriculum.

Achievement over the first three years rose very slowly. In the third year an intensive study of all four grades was done which included classroom observation, interviews with a sample of students and all fourth grade teachers. These results found grave deficiencies in the instructional practices, and curriculum insufficiency in subject matter. As a consequence of this study an in-service program for principals on the monitoring of classroom instruction for securing a data base to improve teacher and student performance was introduced.

Sharp gains in achievement derived from this effort. As the principals became aware of the great differences in teacher performance, specific foci for improvement of teacher performance would be identified, objectives set and results evaluated. Several of the lowest performing teachers resigned under the new system of instructional monitoring rather than accept the commitment for meeting specific objectives in instruction and curriculum. Subsequently substantial achievement gains have been made at each grade level for both races. These gains date from direct attention to curricular and instructional concerns and their interaction. A school is a learning system where the interaction of curriculum and instruction contributes in a large measure to the classroom

experience. In this case action on these determinants led to a stabilized school district where parents are expressing greater satisfaction with the school and the community has not experienced a flight under the desegregation plan. Because of the improved achievement of all students and the attendant pupil-parent satisfaction, the community is experiencing an influx of new inquiries from parents who are seeking a high achieving, integrated setting for their children.

We have concluded from our five year study that attention to the variates of curriculum and instruction with a specified improvement effort pays greater dividends than working on the more nebulous interpersonal variables which are the focus of much organizational development projects. Improved learning environments do bring increased personal satisfaction to students and contribute to the primary mission of the school, academic achievement. Parents seek both of these for their children and fear desegregation because they believe, and rightfully so in many cases, that it poses a threat. It is our belief from our experience and research in Forrestville that attention to curriculum and instruction and how they interact in classrooms is a necessary first step to successful desegregation where the problem of classroom performance becomes salient under the social change that is structurally superimposed on a school system.

A Level 6 Study (Eash, Rasher, and Walberg, 1977). Clockville, a school district serving a number of disparate, heterogeneous communities, received a federal Title 1 grant to develop an alternative middle school. This middle school was designed to develop curriculum, instruction, and instructional materials for students who were not benefiting or were experiencing difficulty with the traditional curriculum in the schools. In a planning year which included community representatives, school staff and university consultants, the following objectives were identified:

1. The Model School program, during the course of a regular nine-month school year, will demonstrate community involvement (both the Model school into the community and the community into the Model School) to a greater degree than that shown in our present school structure.

2. The learning environment of the Model School program will provide a humanized setting for students. This will be accomplished with the help of staff, rules and procedures, and attention to minority group concerns, as well as the physical school environment.

3. Over the course of the program year, Model School students will show at least as much growth in the cognitive domain as similar students in the traditional school.

4. Over the course of a program year, Model School students will show greater growth in the affective domain than students in traditional schools.

5. Model School Pupil Personnel Service efforts will be completely integrated with all other efforts of the total Model School team to approach a student's total educational environment as a whole in order to provide a more consistent approach toward increasing the effectiveness of the Model School's PPS effort.

6. The Model School will demonstrate by testing results that its program can raise the overall quality of education without an increase in cost per student.

These objectives were a guide to the school (hereafter referred to as Model School) in developing innovations in curriculum, instruction, and instructional materials with groups of students.

From the eight junior high schools within the district, 600 students were recruited or volunteered to attend Model School. Due to the funding only 300 sixth, seventh, and eighth graders could be accepted and these were designated by random selection by the university evaluators. An evaluation research design was drawn up to gather data on each objective and to provide results for feedback to the Advisory Committee and the administrators.

The primary data sources were standardized achievement tests, a classroom learning scale (Anderson, 1973), a self concept measure (Gordon, 1968), classroom observations (Kunkel and McElhinney, 1970), and interviews with teachers, students, and parents. In order to give the project guidance, data results were reported twice a year to the administration, teachers and Advisory Committee of parents. In addition to fulfilling state requirements on the grant, a summative

evaluation of the project at the end of two years of operation was prepared. For the purposes of determining whether the curriculum, instruction, and materials interactions had any carryover effect, a two-year follow-up study was conducted with a randomly selected sample of students. Sixty students were interviewed (30 experimental and 30 control), grade point averages were checked for all the sample who remained in the Clockville High Schools, drop out rates for both groups computed, descriptive questionnaire data on student activities compiled, and learning environment and self concept measures administered.

The evaluation design had an unusual advantage over most research in naturalistic settings inasmuch as it had randomized the subjects to the experimental and control groups and established a solid base for control of error and attrition of results to treatment. Three questions were addressed in the study:

1. Does reorganization of curriculum for greater student choice and determination of content make a difference in student achievement and psychological outlook (short term and long term)?

2. Does change in instructional design to grant students a larger role in participation (from teacher centric to pupil centric) make a difference in student achievement and psychological outlook (short term and long term)?

3. Do different instructional materials, chiefly more experienced centered than publisher centered, make a difference in student achievement and psychological outlook (short term and long term)?

As the diagram in Level 6 studies indicates, these relationships are interactive and non-linear, and the interaction constitutes an independent variate which influences the dependent variate of student achievement and attitudes. The data on achievement and attitudes (the latter measured by a self concept test, learning environment scales and interviews) were subjected to statistical analysis which compared the experimental and control groups for the two years of the Model School's existence and at the end of two years in high school.

The weight of the evidence from the study supports the conclusion that purposeful intervention to design changes in curriculum, instruction,

and instructional materials did have immediate and long range consequences for the experimental students. Paper and pencil measures are crude tools especially when psychological nuances which are important in human interaction are sought. Nevertheless the multiple measures made over time found the experimental students to be responding to the interaction of a changed educational treatment on curriculum, instruction, and instructional materials. In brief, the experimental students were doing better academically, they had short term improvements in self concepts and they were more effectively coping with the learning environment of the high school two years later (Eash, Rasher, and Walberg, 1977).

Several other significant findings emerged from the study. Of particular interest methodologically, the learning environment scales were sensitive to subtle differences in the two groups earlier than the achievement tests and self concept measure. The self concept scale picked up differences in the two groups at the end of the school year, and the achievement differences came out at the end of the two-year follow-up. The strength of randomization for control of error was apparent in the drop out rates of the two groups each having 14, one eight girls and six boys, the other eight boys and six girls. The experimental group in interview situations was more assured and confident and seemed to be using the resources of the high school more effectively in their education and were more specifically goal oriented and seemed to reflect less angst as they spoke of their future vocational orientation.

While the literature on the variables of curriculum, instruction, and instructional materials leans to the descriptive and is extremely limited on causal studies, these data do speak very clearly to the fact that intervention on these three variates does have measurable consequences. Moreover, the benefits conferred on this study of random assignment gives us confidence in attributing these effects to the educational treatment employed and not to chance.

Conclusion

The role and function of curriculum instruction, and instructional materials in an educational program has been the subject of discussion among curriculum specialists for over 50 years. While the argument

continues as to whether these can be regarded as separate entities, decisions nonetheless about each are being made outside the naturalistic setting that affect the other when implemented in classrooms. Each determinant can have an effect on the learning environments, however, the effects prove interactive once put into practice. The paradigm presented may help in designing studies of the effects of curriculum, instruction and instructional materials on learning environments and sort out the varying relationships and interactive effects.

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LEVELS

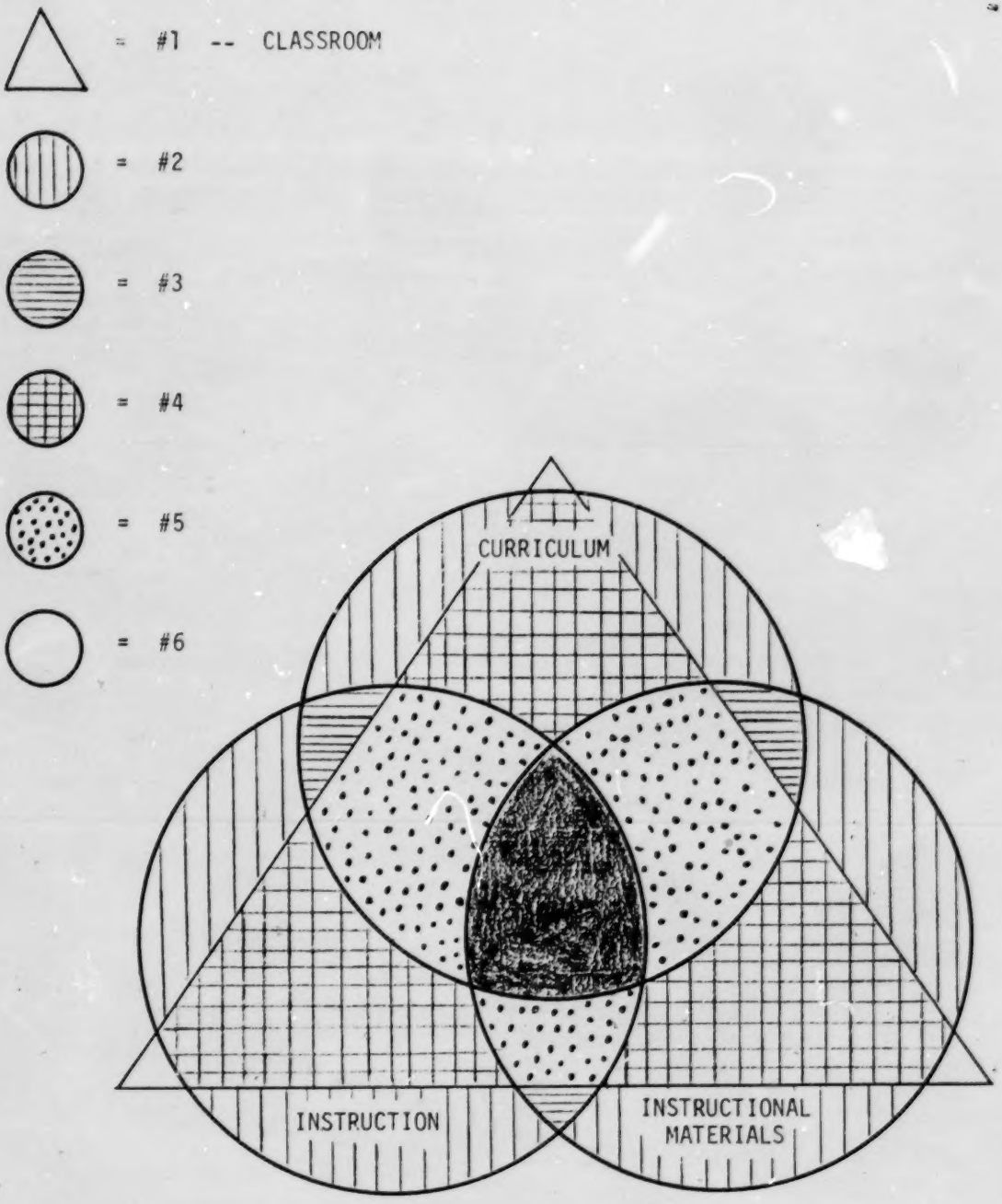

Figure 1. Paradigm for Designing Evaluation Studies of Three Determinants of the Learning Environment